THE SCIENCES

PUBLISHED BY
THE NEW YORK
ACADEMY OF
SCIENCES

The Sciences
VOL. 1, NO. 8, SEPTEMBER 15, 1961

THE DRIFT OF RURAL POPULATION to urban centers is increasing at an accelerated pace. The reasons for this development are many and varied, and have been widely discussed. One factor that may provide an interesting insight into population shifts, however, is the disparate attitudes toward land and land tenure that prevail in different areas. Recent studies indicate a possible relationship between these attitudes and dowry and inheritance practices.

In *Peasant Society and Culture,* Robert Redfield suggests that Mediterranean peasantry takes an instrumental view of land and prefers town occupations, perhaps because of the ancient Greek tradition of city dwelling that influenced the entire Mediterranean region. On the other hand, peoples in northern and eastern European rural areas, he wrote, feel a strong personal and mystical association toward the land, with the result that they attach strong moral value to the industrious pursuit of agriculture.

This contrast in the attitudes and practices of the Irish farmer and his Greek counterpart was touched on by Ernestine Friedl, at a meeting of The Academy's Division of Anthropology.

Among the Irish, she said, land holdings are not diminished when daughters are dowried. The marriage portion takes the form of money which is given by the bride's father to the father of the groom. Thus, the bride's father is able to pass on intact his land holdings to one of his sons.

In Greece, law and custom dictate that each child is entitled to an equal share of property. Furthermore, marriageable daughters generally have first lien on the property. If the father's holdings are deemed to be insufficient to support all the sons, one or more of them will be trained for nonagricultural pursuits. This training may be considered the equivalent of all or a major part of the son's prospective inheritance.

The Greek's bride's dowry is considered as apart from the property which the groom will or has inherited from his father; it is property held in trust for the children of the couple. In effect, dowry is a means of transmitting property from the woman to her children.

The social mores of the Greek village also affect the distribution of this property. In order to avoid the incest prohibitions of the Greek Orthodox Church, and because it is possible to make more advantageous marriages in other communities, village exogamy is the most frequent arrangement. The bride's dowry lands remain in her father's village, a not too convenient arrangement, since they must be worked by the couple or by affinal relatives on a share basis. Eventually, therefore, the land may be exchanged or sold.

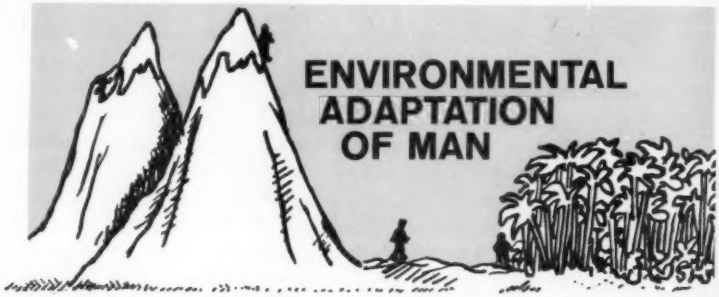
The combination of these factors stimulates land transfers, with the further result that development of strong sentiment for particular plots of land is precluded. Land is valued as a source of income and not as an extension of oneself, according to Professor Friedl.

Such is not the case in Ireland. In *Family and Community in Ireland,* C. M. Arensberg and S. T. Kimball note that land holdings in that country are strongly identified with the patrilineal line. The man who marries into a family that has no male heirs is expected to pay a money-bride price in excess of the value of the bride's estate. It is Professor Friedl's view that this extra payment has its origin in the fact that an incoming son-in-law will ultimately change the patrilineal identity of the estate.

In contrast to the role of the Greek son-in-law who is regarded as a needed laborer in the vineyard of his wife's household, the Irish son-in-law is looked upon as the proprietor of an estate that will ultimately be associated with his and not his father-in-law's line.

The differing systems of dowries and inheritances, therefore, have different effects in each of these countries. In Ireland, where

inheritance of land is restricted to sons, identification of patrilineal lines with land ownership is a source of pride and prestige for generations. In Greece, where women have an equal share in land inheritance and where other means of making a living are acceptable alternatives for the sons, development of unilaterally owned permanent estates is prevented, and land sales and exchanges and a utilitarian attitude are fostered. □ □



WHETHER HE BE of the mountain, the desert or the jungle, man has demonstrated his ability to live almost anywhere in sharply varying terrains and climates. How does he adapt to his environment? By selective genetic processes? Lifetime plasticity? Or is it a combination of both?

In an effort to solve these questions, numerous students have examined such factors as body size, skin pigmentation, subcutaneous fat, sweat glands and bodily adjustments to nutrition, according to a report by Marshall T. Newman, division of anthropology, U. S. National Museum, Washington, D. C., at The Academy's conference on Genetic Perspectives in Disease Resistance and Susceptibility.

Body size may play a role. Greater body size increases the body-mass/body-surface ratio and aids in retaining metabolically desireable heat. In tropical climates, the ratio decreases. Tropical forest people exhibit a small body size, while more linear body builds are found in low-latitude deserts and among savanna dwellers.

There are variations of body size within a group. Eskimos differ in body mass and proportions depending on whether they live in the low or the high Arctic.

It has been assumed that thick layers of subcutaneous fat will be found among cold-climate dwellers, and that thin layers will be

found among those in hot climates. Yet skinfold studies indicate that "overfed and underworked whites carry as much as or more subcutaneous fat than any other people in the world."

In pigmentation, those with heavily pigmented skin possess an advantage in areas of extreme heat and light. "Melanin deposits are a valuable protection against ultraviolet radiation," Newman points out.

Investigators have found wide variation in individual sweatpore numbers for both whites and Negroes. In East Asia, however, "a quite remarkable regression toward more sweat glands in peoples of warmer climates" has been noted. Differences between Japanese in Japan and those raised in the tropics strongly suggest that sweat-gland density may be a plasticity response.

In studying adjustment to heat, M. L. Thompson found lower sweating rates by 0.07 l./sq.m./hour in Nigerians versus European troops, "and lower core temperatures as well under moderate stress conditions." In laboratories and in the mines, the Nigerians are less prone than whites to heat cramps and prostration, despite a low salt intake by the former.

The heat load experienced by desert dwellers is much greater than that in hot jungles. The ideal "desert man" is represented by the itinerant Solubbies of the Arabian desert – "linear in build, low in subcutaneous fat, and brunet in skin color with high tanning potential." One investigator has found that American Negroes of predominantly West African extraction show "superior tolerance to hot-humid climates but not to hot-dry climates."

In reaction to cold, Negroes exhibit larger and more intense vasoconstriction of the extremities. In a study of 716 frostbite cases during the Korean War, L. M. Schuman found that Negroes were six times as prone to cold injury as whites.

The aborigines of Australia may, like Arctic peoples, have an insulative cooling mechanism which conserves body heat. They are able to sleep naked between small fires in the open in freezing temperatures.

A remarkable illustration of the ability to adapt to high altitudes is found in the Quechua-speaking Indians of Peru who live at 15,000 feet elevation in the Central Sierra. They have enormous chests and large lungs and the lung alveoli are permanently dilated to afford greater surface for oxygen absorption. They also have "a 40 per cent

increase in blood volume due wholly to manufacture and maintenance of red cells." Newman points out that mestizos also "get along well at high altitude, but they have never been compared physiologically with the Indians."

As a result, he observes, "there is no direct means of appraising how much of the intricate syndrome of adjustments to high altitudes is due to selection and adaptation and how much to within-the-lifespan plasticity."

Some peoples have made special adaptations to diets which would prove fatal to others. Small body size of adults, late maturation, and slow growth are indications of this adaptation. For example, there is a very low calcium intake among low-class Ceylonese, but no evidence of bony anomalies. Similar contradictions to accepted nutritional standards are found among the Bantu.

Sufficient data are lacking to provide conclusive answers to whether man adapts through a selective process or through plasticity. There may be interesting links to reactions to disease situations. Explanation of these links may come with more comprehensive studies. □ □

IRON AND HISTORY

THE HISTORY OF ironmaking has many fascinating aspects and, as Dr. Joseph F. Skelly noted in a report to The Academy's Division of Engineering, bears on the still intensely active area of developing new processes for the extraction of iron from iron ores.

The Assyrian army was equipped with iron weapons about 2700 years ago. They built new tactics around their new material and easily subdued their relatively primitive opponents who still fought with bronze spears and leather shields. Soon Nineveh became the con-

quering host of their world. "Having achieved great technical superiority over all comers," Dr. Skelly stated, "they behaved with such ferocious cruelty that they quickly came to grief. Weakened by internal decay and infiltrated by enemy agents, the Assyrian nation was totally destroyed by an international coalition only a century after the general arming of their forces with iron apparatus."

A center of ironmaking arose at about the time of the fall of Assyria in the region known as Noricum (now Austria). It was a fortunate fact that ores in that area were low in sulfur and phosphorous and high in manganese, so that the weapons made from its iron lode were reasonably hard and durable. It may be that Philip of Macedon several centuries later knew of the Noricum near-steels; in any case, he equipped his troops with the most modern metal weapons and the action helped Philip's son Alexander to sweep across one-third of Asia, until he was stopped in Western India by warriors who were as well armed with near-steel weapons as his own army. Still later, the swords of Asia Minor, such as the famous blades of Damascus, were fabricated from iron billets shipped from India.

The great surge of Hunnish militarism probably owed much of its success to steels. The same was true of the several later Asian invaders of Europe who followed the Huns: the new Islamic groups, the Mongols, the Saracens and others.

"During these times of repeated massive onslaught against Europe by the militarists of Asia, the charcoal reduction process for making iron was widely practiced throughout the Old World. Toward the close of this period, however, the deforestation of the inhabited parts of Europe and Asia had advanced to the point where it was becoming increasingly difficult to obtain enough wood charcoal to meet the growing demand for iron. During the Sixteenth and Seventeenth centuries, European iron men experimented with other forms of carbon . . . [They] mixed wood charcoal with various kinds of coal, coke, and lignite in an attempt to stretch the diminishing charcoal supply and to find a substitute. Finally the great technical breakthrough occurred in 1727, when Abraham Darby, in England, succeeded in using a particular kind of coke for the complete replacement of charcoal in the iron furnace."

European technology made major strides, while Asia's was de-

pressed by the absence of coking coal which by then was essential for the production of economically competitive iron. Of course, many other factors affected the advance of technology and the courses of cultural history, but the role of iron and ironmaking capacities cannot be underestimated.

"India, China, South America and many parts of Africa are liberally supplied with high grade ore. What they lack is a good supply of a suitable reducing agent. It is this deficiency of reducing agents that is supplying the incentive for our modern efforts to develop new ironmaking processes. Other motives for this great effort in research and development may be connected with shortages of capital and the exhaustion of high-purity ore deposits, but the great impetus comes from the mounting demand for iron in the 'cokeless' areas of the world."

Generally, the lower the quality of ores, the greater the cost of extraction. Many processes exist and others could be designed, but "the steel industry is rapidly discovering the wisdom of following the chemical industry's familiar practice of purifying the raw materials before charging them to the main reactor." About 15 million B.T.U. are consumed to produce one ton of iron; the high temperatures and corrosive qualities of the reduction environment constitute a problem for engineers and the vessels they build: reactants must be intimately mixed and the consistency of the fused materials make this difficult. A standard modern blast furnace can make 2000 tons of nonspecialized steel in a day. Pilot installations of some of the newer processes have, so far, reached 200 tons per day.

There are five major categories of ore-reduction processes: (1) moving bed (2) rotary kiln (3) electric furnace (4) fluidized bed (5) fixed bed. Each finds most efficient use in accordance with the type of finished product desired. Progress is being made in developing the newer techniques, but for the present "the blast furnace [a moving-bed unit] is the only universal process, thoroughly demonstrated in large-scale installations."

"In attempting to predict the political consequences, if any, that may follow from the widespread use of the new iron ore-reduction processes, we realize," Skelly stated, "that a daring—even fool-hardy

– proposition has been advanced . . . It has been suggested that the relative development of iron and steel technology plays a powerful part in determining large-scale political changes. Of course, this theory is a gross over-simplification of the complicated historical process. There are far more things in life than austenite and mastensite, but it is sometimes possible to obtain an understanding of the major elements in a complex process by means of highly simplified models . . . This ferrous hypothesis is offered, therefore, as a crude model . . . which might have some utility for purposes of prediction. In attempting to look into the future, we notice that almost all of the backward countries that are now struggling to raise their standard of living place the utmost importance on increasing their own production of iron and steel . . . The widespread commercial application of the new iron processes in the cokeless areas of the world could be very beneficial . . . The new processes can raise the standard of living of a large part of the world's population and can bring about a more stable distribution of political power. The appearance of a new Sargon or Alexander to resume the course of conquest would be a sad blow to humanity. The prevention of such an occurrence is a major task for coming generations." □ □

WHAT HAPPENS WHEN A DISEASE-PRODUCING organism invades a plant? What is the physiological process in plant disease?

Some of the answers to these questions were explored by Armin C. Braun, of The Rockefeller Institute, before The Academy's Division of Mycology, in a discussion of toxic metabolites that act as general protoplasmic poisons and of metabolites that stimulate

growth, modify morphology and induce loss of typical organization.

Infectious diseases of plants may result when a pathogenic organism, nurtured by the invaded host, produces metabolites harmful to the plant. Braun cites soft-rot bacterium, *Erwinia carotovora,* which produces an enzyme, protopectinase, that causes the middle lamella of storage parenchyma cells to lose their cohesiveness. As a result, the protoplasm of the separated cells collapses, and the affected tissue decays. Glucosans and fructosans isolated from pathogenic bacteria have been found to induce wilting in tomato cuttings, while wilting similar to that caused by bacterial slimes can be induced in plants by introducing synthetic polyvinyl alcohols or polyethylene glycols into the vascular region.

An example of the type of metabolite that acts as a general protoplasmic poison is the substance associated with wildfire disease in tobacco. The tobacco leaves develop chlorotic haloes that surround a brown necrotic spot. The chlorotic area, which is free from bacteria, is caused by diffusion of a toxic substance secreted by the bacteria in the central necrotic focus of infection.

To determine the wildfire toxin's mode of action, the toxic metabolite was incorporated into a culture medium containing the alga *Chlorella vulgaris.* The growth of Chlorella was inhibited, says Braun, but when L-methionine was utilized the growth inhibition was reversed, "indicating that the toxin and methionine were competing for active centers on an enzyme that is normally concerned in the utilization of methionine by Chlorella."

It was also found that methionine sulfoximine, the known structural analogue of methionine, reproduced perfectly the toxic manifestation of wildfire. Chlorella mutants resistant to wildfire toxin were found equally resistant to comparable concentrations of methionine sulfoximine. These and other studies, according to Braun, "indicate that the wildfire toxin is a structural analogue of methionine that owes its biological activity to its behavior as a naturally occurring antimetabolite of that essential amino acid."

Of the metabolites showing great specificity of action, one polypeptide in the fungus *Helminthosporium victoriae* is among the most selective toxins known. The only organisms susceptible to its action are oat varieties bearing appropriate genes. The peptide consists of two components: a pentapeptide that yields aspartic acid, glutamic

acid, glycine, valine, and one of the leucines on hydrolysis, and a tricyclic secondary amine with a single double bond.

The secondary amine is toxic to both susceptible and resistant oat varieties, suggesting to Braun that it may be responsible for the toxicity of the toxin, while the specificity of the compound may be the function of the peptide portion of the molecule.

Some metabolites stimulate plant cells to excessive growth. Notable among those that produce harmonious manifestations of normal developmental potentialities is the Bakanae disease of rice caused by *Gibberella fujikuroi*. Apparently, inhibitions to cell enlargement are removed by biologically active gibberellin compounds.

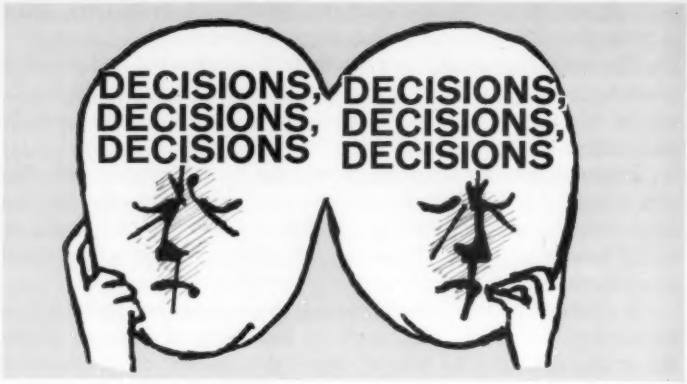
In contrast to the gibberellins are the metabolites that produce morphologic abnormalities, such as frenching of tobacco plants; this is characterized by loss of apical dominance, development of axillary shoots and formation of an unusually large number of leaves.

Other metabolites induce loss of typical organization in plants. These can be subdivided into two types: self-limiting and non-self-limiting.

In the first category, continued growth abnormalities (or excrescences resulting from activities of specific bacteria, viruses, slime molds, fungi, nematodes, mites, and insects) seem to depend on continued stimulation by the invading parasite. The metabolites produced by parasites to stimulate plant cells to excessive growth are not only varied; some seem to be relatively non-specific, while others "appear to possess highly specific organizing properties."

In the second group the growth may be initiated by a very different type of agency. Braun cites crown gall disease, in which the inciting bacterium, *Agrobacterium tumefaciens*, converts normal plant cells into tumor cells in a short period of time. As a result of the transformation these cells acquire a capacity for continued abnormal and essentially unregulated growth in the absence of the inciting organism.

The transition from normal to tumor cells apparently involves "excessive production by the tumor cell of two intracellular growth hormones that are concerned specifically with processes of cell enlargement and cell division." However, says Braun, the mechanism by which the tumor-inducing agencies activate the enzymatic machinery of the cell is not yet clear. □ □



EVERYONE IN THE U. S. IS ASSURED the right of trial by a jury of his peers. But how many would rather entrust their fate to one man instead of twelve? If a consistent superiority or inferiority of individual versus group decisions could be definitely established, the answer would seem obvious.

Experimental evidence on the subject of decision making has been equivocal. But recent research is approaching the problem from the point of view of defining conditions under which either individual or group decisions may be superior.

One study, reported by Irving Lorge, of Teachers College of Columbia University, at The Academy's Division of Psychology, involved 177 Air Force officers who were given the following morale problem to solve:

At an imaginary Air Force base isolated in desert country facilities are inadequate to care for a recent increase in activities; A.W.O.L. and V.D. rates are unusually high and the social and recreational facilities of the nearest town seem to be limited to gambling, drinking and prostitution.

The officers were told:

"State a plan of action to solve this problem. Your plan should be complete; that is, it should cover all aspects of the problem. Your plan should also be specific, that is, each step or action should be specified concretely."

The decisions were written during two consecutive 50-minute periods.

In the first, 75 of the men selected at random wrote individual

decisions (Individual First decisions). The remaining 102 were divided into 17 groups of six members each to write a decision as a group (Group First decisions).

In the second period, those who had written Individual First decisions were organized into 12 groups to write group decisions (Group Second decisions); while 45 of those who had participated in the writing of Group First decisions were asked to write decisions as individuals about the same problem (Individual Second decisions).

The quality of the decisions was rated by a technique that involved a content analysis of points or ideas in a decision, and the assignment of a numerical value for the judged quality of each point. The sum of numerical scores or the quality values for the points in a decision gave the quality score for the total decision.

The average quality score for Individual First decisions was 18.6; for Group First decisions, 13.1. For the second period the score was: Individual Second, 22.1; Group Second, 19.8.

Comparing decisions made by the same subjects as individuals and groups, it can be seen that the average of Individual Second decisions was significantly superior to the average of the Group First decisions, whereas there was no significant difference between the quality of Individual First and that of Group Second decisions.

In other words, according to Lorge, while the "data are incontrovertible" in showing that the quality of the average individual decision is superior to that of the average group decision in deciding realistic, complex problems in a short period of time, "after fifty minutes of experience with the same problem . . . there is no significant difference between the quality of the average individual and group decision. If members of a group write individual decisions after making a group decision about the same problem, in general those . . . decisions . . . are superior to the initial group decision. On the other hand, if subjects first write individual decisions and then meet to write a group decision, in general, despite the additional time, these group decisions are not superior to those written initially by the individual group members."

Lorge also points out that "groups are more critical of ideas and suggestions," with the result that there is a tendency to write down fewer of the good ideas discussed. In contrast, he adds, the individual "tends to record ideas over the full range of the factors in the problem." □ □

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